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WATER-WORN COAL PEBBLES IN CARBONIFEROUS SANDSTONE

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The accompanying photograph illustrates rounded pebbles of bituminous coal, one of which is shown imbedded in a coarse-grained sandstone. These pebbles are exposed in large numbers in a stone quarry which is located¹ on the banks of the Warrior River just above Lock No. 12, Tuscaloosa, Ala., and but a short distance from the State University. The sandstone is in some places very coarse and conglomeratic. In many cases the coarse fragments making the conglomerate are angular, having received but little wear. At the locality where the coal pebbles occur most numerous there is much cross-bedding of the sandstone and a marked difference in the coarseness and fineness of the sediment together with considerable contemporaneous erosion, thus giving evidence of a delta deposit. In the sandstone which carries the coal pebbles are found many fragments of carboniferous trees. The geological position of this sandstone is near the top of the coal measures of the Warrior Coal Field, being about 60 feet above the Duree coal seam and about 30 feet below the Brookwood coal seam of the Brookwood group (the highest known group of coals in the Warrior field). The size of the pebbles varies from $\frac{1}{2}$ -inch to 15 inches or more in diameter. One pebble observed had the shape of a prolate spheroid about 18 inches long and nearly 12 inches thick. This was imbedded in a coarse-grained sandstone.

An analysis of the coal, from the pebble shown in the photograph imbedded in the rock, is as follows:

Moisture.....	2.42
Volatile matter.....	38.73
Fixed carbon.....	56.06
Ash.....	2.79
	<hr/> 100.00

¹The occurrence of coal pebbles at this locality was first called to my attention by Dr. E. A. Smith of the University of Alabama.

The above analysis shows the specimen to be a high-grade bituminous coal. Its composition is almost identical with that of the seam which lies some 60 feet below it, the Duree seam of coal which gives the following analysis:

Moisture.....	2.30
Volatile matter.....	38.58
Fixed carbon.....	54.11
Ash.....	5.01
	<hr/> 100.00

The origin of the pebbles is not perfectly clear. That the material forming the pebbles was water-worn before being imbedded in

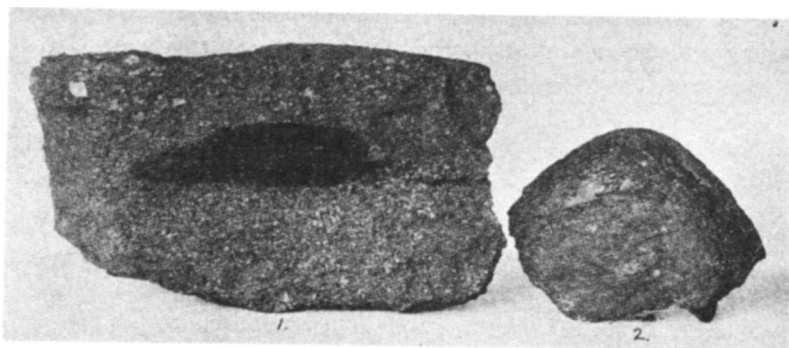


FIG. 1.—Water-worn coal pebbles occurring in coarse-grained sandstone in upper measures of Warrior Coal Field, Ala. No. 2 is a portion of a pebble 8 inches in diameter.

the coarse sand and conglomerate is very evident, and that the agent of erosion was a carboniferous stream is also evident, but whether the material now forming the coal was then in the form of chunks of coal or pieces of lignite or less carbonized wood is not apparent.

It is a well-known fact that at the present time pebbles of coal are being transported and rounded by stream action, yet the question would naturally present itself as to where the carboniferous stream could get this coal, since it is not possible that the beds of coal below could furnish it without a considerable warping and erosion of the strata prior to the period of the deposition of the coal pebbles, but such warping and erosion is not known, and even

granting such to be the case it would hardly seem possible that sufficient time would have elapsed for the coal bed some 60 feet below or even for other carbonaceous deposits still lower down in the coal measures to yield more than a lignite. It would seem to me therefore that these carbonaceous pebbles were originally transported not as a coal but as chunks of lignite or wood. It seems to me also more reasonable to conclude that they were in the form of lignite rather than in a less carbonized form, since many of the pebbles are nearly spherical and not flattened as would be expected if the pebbles were formed of wood.

Occurrences of water-worn pebbles of coal in the rock are doubtless well known to many geologists, but it has not been my pleasure to see deposits with such large pebbles elsewhere.